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Methodology to point out significant changes in resistivity en IP responses for time-lapse experiments assessed on a synthetic model

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Risks management of contaminated sites may require accurate mid and long term monitoring methods. Electrical Resistivity Tomography in time-lapse mode is frequently used for the monitoring of time-varying processes. Nevertheless, it is tricky to identify significant changes in resistivity and chargeability when the processes vary slowly in time. A new methodology is proposed to estimate the background and to point out significant changes in resistivity and chargeability. This method consists in the estimation the resistivity and chargeability confidence intervals of each model block based on Monte-Carlo simulations. To evaluate this methodology, synthetic models which simulate the evolution of geoelectrical properties at different time were created. This validation is based on two steps. In the first step, background model uncertainties have to be estimated for every block of the model to generate confidence intervals of each model block based on Monte-Carlo simulations. The time-lapse sections stimulated will be compared to this background model. We postulate that each resistivity is affected by an error which follows a normal distribution. The resistivity variations are obtained through random draws of the error that is assigned. The second step is to determine to what extent the observed changes are significant or not and to quantify significant variations.